

August 22, 2016

SUPREME COURT OF THE STATE OF NEW YORK
COUNTY OF SUFFOLK

—X—

DENISE BROUARD and GERALD BROUARD,

Plaintiff,

Index No.: 28560/05

-against-

AFFIDAVIT

JAMES CONVERY, P.V. HOLDING CORP. and
AVIS RENT A CAR SYSTEM, INC.,

Defendants.

—X—

STATE OF NEW YORK)

SS:

COUNTY OF NEW YORK

APOSTOLOS JOHN TSIOURIS, M.D., being duly sworn, deposes, says and affirms the truth of the following matters under penalty of perjury:

I am a staff neuroradiologist at The New York-Presbyterian Hospital – Weill Cornell Medical Center in New York City. My rank is Associate Professor of Clinical Radiology. I have 13 years of experience in a very active clinical neuroradiology practice, in which I primarily interpret CT and MRI scans of the brain and spine. I am currently actively involved in investigating diffusion tensor imaging (DTI) for the evaluation of mild traumatic brain injury as part of

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an ongoing collaborative research studies with the Hospital of Special Surgery (NY, NY) and the department of Neurosurgery at Weill Cornell Medical Center. I routinely analyze and review DTI data sets for the purposes of neurosurgical brain tumor pre-operative planning. I lead and moderate weekly multidisciplinary neurovascular and neurosurgery conferences.

I have testified as an expert in other proceedings relative to my expert opinions and knowledge and I will testify in Court at any hearings and/or trials as required. All of my opinions herein are stated with a reasonable degree of medical and scientific certainty.

My duly sworn affidavits dated May 23, 2012 and July 26, 2012, from the matter of *Velez v. Mejero Index Number 115897/08, Supreme Court of the State of New York, County of New York* are applicable to the facts of the current matter. These affidavits are previously submitted in the instant matter and annexed to the Affirmation in Support by Matthew I. Toker, Esq dated September 14, 2014, as Exhibit "L". For the sake of brevity, and to not repeat what has already been said therein, I incorporate by reference all of the facts and points in those affidavits to the instant affidavit.

I have reviewed a Supplemental Affirmation written by Mr. Flomenhaft on May 2, 2016, a Supplemental response written by Mr. Flomenhaft on April 16, 2016, an Affirmation in Reply and in Opposition to Defendant's Cross-Motion written by Mr. Flomenhaft on February 10, 2016, and an Affirmation in Support written by Dr. Lipton on February 9, 2016. I have a number of criticisms concerning the points made on these documents that I will outline below:

1. It is disingenuous to state that diffusion tensor imaging (DTI) is not being offered as a diagnostic test for traumatic brain injury (TBI) in the setting of this litigation. In the setting of an alleged head trauma, the main point of contention is whether the plaintiff suffered a brain injury. Dr. Lipton argues repeatedly that the plaintiff is known to have suffered a traumatic brain injury and is documenting the extent of the brain injury on the DTI scan based on this knowledge. However, it is my understanding that the existence or lack thereof regarding a traumatic brain injury is the central issue in this case. Plaintiff and Dr. Lipton are putting the cart before the horse. Dr. Lipton would have

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to admit that *absent* a traumatic brain injury the purported DTI abnormalities would necessitate an *exhaustive* differential for possible causes of the reported FA abnormalities. DTI cannot serve as a tool to diagnose or support the claim that the Plaintiff has suffered from a traumatic brain injury. Given Dr. Lipton's reasoning, absolute certainty that a traumatic brain injury occurred is necessary for the DTI results to have any significance. This is one of many reasons why DTI is generally accepted only in the research setting and not the clinical setting; in the research setting we are comparing a group of individuals proven to have TBI through other means (and outside of litigation) with a well matched control group known to have never suffered a TBI, in an effort to learn how to accurately apply the technique to a single patient and use it to assess the brain injury. That is the method that the peer-reviewed papers address. That is not the method Dr. Lipton and Plaintiff are purporting to employ in the instant matter. They are comparing a single subject that does not have a confirmed TBI with a control group in order to conclude that Plaintiff had a TBI and determine its severity. Dr. Lipton was not the treating physician in this case, and has no experience in his practice directly treating patients with TBI. More importantly, even if DTI was an accepted, accurate and precise test for the evaluation of TBI, *which it is not*, the findings have no clinical utility in practice since the current therapies would be the same regardless. All that the results would accomplish would be to inform the patient that they have "brain damage", which in itself may be psychologically counter-productive to a good recovery. This is another one of many reasons that DTI is not currently generally accepted to diagnose, categorize, prognosticate or guide the clinical treatment of patient with TBI.

2. Dr. Lipton's recently published research article titled "Subject Based Registration for Individualized Analysis of Diffusion Tensor MRI" (Suri et al. *PLOS ONE*, Nov 2015) submitted as evidence concludes by stating:

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Conclusion

Detection of image abnormalities in a single subject requires comparison of that subject's images to those of a control group. To ensure analogous brain regions are compared, subject and control images are registered to a template. Typically, a canonical atlas or a subject selected from the control group serves as the template. This type of atlas based registration (aBR) approach suffers from potentially important errors of accuracy due to misregistration of the subject's brain to the atlas. The sBR approach results in a significant reduction of erroneous findings that arise from these registration errors. The resulting *SUbject-REgistered Quantification (SURE-Quant)* analysis can greatly facilitate utilization of quantitative image analysis in the clinic and can be applied to many quantitative imaging measures, even beyond diffusion MRI.

To summarize in layman's terms: 1. The control group data is absolutely necessary to perform and independent expert analysis of any DTI studies, and this data was never produced by the Plaintiff in the instant matter; 2. The original voxel-based analysis technique that Dr. Lipton has been using since 2003/2004 and upon which prior Frye hearings concluded was scientifically sound "*suffers from potentially important errors of accuracy*" and is therefore reported to be obsolete by Dr. Lipton in his own words; and 3. The subject-based registration (sBR) approach that Dr. Lipton advocates in his new paper supposedly significantly reduces the errors in the analytical approach that he has been using over approximately the past 10 years; that is until the next paper published concludes that his current sBR approach is also prone to major artifacts and is also highly inaccurate. Dr. Lipton is simply documenting his technique's error rate in his reports and not the patient's axonal injuries.

3. In an excellent paper by Dr. Tramifow from New Mexico State University (More Reasons Why Diffusion Tensor Imaging Is Problematic in Medicolegal Settings. *AJOB Neuroscience* April-June, Vol 5, No 2, 2014), he states:

"...in voxel-based analyses, the more comparisons that are made, the larger is the probability of finding an abnormal pixel just by chance alone. In the average case, there are more than 2 million pixels, so using the usual .05 criterion would result in more than 100,000 pixels being found to be abnormal just by chance alone. Because of this, it is

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important to use appropriate procedures to adjust the criterion (the usual .05 cutoff level) for the number of comparisons made. Although Wortzel and colleagues are certainly correct about the multiple comparison issue, my foregoing comments suggest a far more basic point. Specifically, even if one uses appropriate procedures to ensure that the nominal and actual probabilities (p values) are the same, there is still a basic problem. Even an appropriate analysis will only provide the probability of detecting a particular number (or range of numbers) of abnormal pixels given the hypothesized injury, whereas what is needed to draw a valid conclusion about the likelihood of brain injury is the inverse probability: *that is, the probability of the hypothesized injury given the particular number of abnormal pixels detected. In short, the probability of abnormal pixels given brain injury does not equal the probability of brain injury given abnormal pixels. Also, the correlation between the two probabilities is low.* Thus, the dependence of DTI interpretation on the invalid null hypothesis significance testing procedure (NHSTP) in medicolegal settings constitutes an ethical breach, and ethicists should resist it.

...I have argued that a basic statistical issue...is the invalid inverse inference from the probability of a finding given a hypothesis to the probability of a hypothesis given a finding. Of course, it is the latter conditional probability that is at issue in medicolegal settings."

In laymen's terms, the key statistical analyses utilized in research to determine whether or not there is a significant difference between groups or an individual and a group is only

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valid if the investigational group or individual is definitively known to have the disease/disorder in question. This is not the case in litigation, when the presence of the disease/disorder (TBI) is the central point of contention.

4. I have not reviewed or analyzed either the 2008 or the 2014 DTI data on the Plaintiff, **and cannot do so because Plaintiff and her expert Dr. Lipton have not produced all the necessary data that Dr. Lipton reviewed and relied upon. Without this data it is impossible to analyze the Plaintiff's DTI.** However, I would point out that if the 2008 DTI is now obsolete because the MRI acquisition and the analytical methods used for that study have been shown to be inaccurate as per Dr. Lipton's recent publication in *PLOS ONE*, this would de facto render any prior Frye and/or Daubert decisions/analysis decided based on Dr. Lipton's prior methods invalid. A common occurrence in medical research is that methods and results once thought to be appropriate and generally accepted are later discovered to be prone to various errors/issues that prove them invalid with additional investigation. Here, Plaintiff and Dr. Lipton confirm this, as they are representing the 2014 DTI as the more advanced and/or accurate test, superseding the now proclaimed inferior 2008 DTI.

5. In addition, if the control group data utilized to analyze the 2008 DTI scan no longer exists (as claimed by Plaintiff and/or Dr. Lipton), an expert cannot perform a complete independent analysis of that DTI scan to confirm or dispute the results. The control data is not required to generate the color-coded fractional anisotropy (FA) maps of the brain, but **it is required to determine if those measurements are abnormal. Since all FA values measured on a DTI study are machine-specific, and those machine-specific normal values are obtained from the control population (in this case, 20 or 48 normal patients), they are absolutely necessary for independent analysis. Descriptions of the control population in Dr. Lipton's publications are useless in a legal case where an independent expert is attempting to assess the accuracy of the analysis performed.** The goal of describing the population in a scientific paper is to allow scientific peers to determine if the methodology and analyses were correct. This is not the goal of litigation; the role of an expert witness is to be able to objectively review all the data. **If a scientific paper is thought to be fraudulent and is challenged, then all the data described in the paper is usually reviewed**

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independently to determine if the methods and/or analysis were in any way deficient. Occasionally, scientific papers are retracted for this reason. Thus, Plaintiff and Dr. Lipton's argument that they only need to provide to the defense the same information they provide for peer review is a highly flawed. **The correct analogy is that if Plaintiff and Dr. Lipton are seeking to introduce DTI evidence then they must provide the same data that would be required for review if a scientific paper is challenged because just like in the legal setting, both are adversarial processes.**

6. The two new papers cited as additional evidence of the utility of DTI in the setting of TBI are misleading and do not add to the literature. Strauss et al. Current Clinical Applications and Future Potential of Diffusion Tensor Imaging in Traumatic Brain Injury. *TMRI* Dec 2015 is a review article authored and/or edited by Dr. Lipton. This provides no new scientific evidence and the neuroradiology community is already well aware of Dr. Lipton's opinions. The second article cited as new evidence (Veermuthu et al. Diffusion Tensor Imaging Parameters in Mild Traumatic Brain Injury and Its Correlation with Early Neuropsychological Impairment: A Longitudinal Study. *J Neurotrauma*, Oct 2015) demonstrates a non-causative association between FA abnormalities in the splenium of the corpus callosum and TBI of a *group* of traumatic brain injury patients (Table 3), which has been well described in the literature:

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TABLE 3.

DIFFERENCES OF DTI METRICS (FA, MD, AND RD) BETWEEN PATIENTS WITH MTBI ACUTELY AND BASELINE SCANS OF HEALTHY CONTROLS

DTI metrics vs. tracts	Group	N	FA		MD		RD		p value		
			Mean	SD	Mean	SD	Mean	SD			
Middle cerebellar peduncle	CTRL	19	0.611	0.032	0.869	0.698	0.034	0.168	0.432	0.038	0.514
	TBI	61	0.612	0.025		0.711	0.036		0.438	0.033	
Corona radiata	CTRL	19	0.532	0.028	0.435	0.792	0.019	0.104	0.535	0.029	0.785
	TBI	61	0.538	0.025		0.802	0.025		0.537	0.028	
Anterior limb of internal capsule	CTRL	19	0.636	0.024	0.297	0.791	0.018	0.147	0.462	0.023	0.130
	TBI	61	0.629	0.026		0.800	0.027		0.474	0.029	
Posterior limb of internal capsule	CTRL	19	0.719	0.028	0.315	0.784	0.028	0.028	0.392	0.031	0.110
	TBI	61	0.712	0.025		0.800	0.027		0.406	0.030	
Cingulum	CTRL	19	0.560	0.029	0.561	0.757	0.028	0.020	0.495	0.027	0.064
	TBI	61	0.555	0.030		0.777	0.032		0.510	0.032	
Superior longitudinal fasciculus	CTRL	19	0.522	0.024	0.656	0.769	0.022	0.280	0.528	0.028	0.325
	TBI	61	0.519	0.024		0.775	0.024		0.535	0.025	
Optic radiation	CTRL	19	0.631	0.036	0.154	0.848	0.039	0.002	0.494	0.048	0.015
	TBI	61	0.619	0.029		0.878	0.035		0.521	0.039	
Genu of corpus callosum	CTRL	19	0.766	0.030	0.499	0.811	0.027	0.309	0.360	0.039	0.519
	TBI	61	0.760	0.031		0.820	0.036		0.368	0.043	
Splenium of corpus callosum	CTRL	19	0.855	0.028	0.038	0.737	0.034	0.016	0.233	0.045	0.020
	TBI	61	0.842	0.023		0.781	0.030		0.258	0.037	

Variances in the group were similar for all comparisons.

DTI, diffusion tensor imaging; FA, fractional anisotropy; MD, medial diffusivity; RD, radial diffusivity; mTBI, mild traumatic brain injury; SD, standard deviation; CTRL, control; TBI, traumatic brain injury.

This does not constitute new evidence that the test is accurate or reproducible in *individual patients*, but only adds to the literature that in group-based analyses we can find FA abnormalities in certain regions of the brain, the corpus callosum being the most common region, an assertion that is not disputed.

7. The American College of Radiology (ACR) sponsored white paper written by Wintermark et al. and titled “**Imaging Evidence and Recommendations for Traumatic Brain Injury: Advanced Neuro- and Neurovascular Imaging Techniques**” was published in the American Journal of Neuroradiology on November 25, 2014. This medical consensus paper was written by members of the ACR’s Head Injury Institute (HII) to help guide appropriate imaging for patients suffering from traumatic brain injury. The co-first author of this publication is Dr. Pina Sanelli, who holds a Masters in Public Health from Harvard Medical College. She is also currently the EVIDENCE BASED MEDICINE CO-CHAIR of the American Society of Neuroradiology (ASNR). Dr. Sanelli, the co-authors, and the ACR staff

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systematically reviewed all the available literature on DTI in the setting of traumatic brain injury and classified them by their level of evidence. Based on all the available literature, **DTI was given a *Class IIb recommendation*, which states that the usefulness/efficacy of the test is less well established.** Dr. Sanelli decided that the 2001 Oxford Center for Evidence Based Medicine Levels of Evidence were more appropriate to use for this review than the newer 2009 classification. A rigorous review and classification of all the literature was performed, however due to word count limitations imposed by the journal, could not all be included.

8. I am a member of the ACR Head Injury Institute and was so when the White Paper was written. I was also one of the named co-authors. **Dr. Lipton was a member of the ACR's Head Injury Institute when this paper was drafted and was allowed to review, edit and make recommendations/suggestions before publication. Many of his comments in his Affirmation were included in an email to the entire HII group of physicians reviewing and editing the white paper. His suggestions were thoughtfully considered, but mostly rejected. He was given the option of endorsing the final edit of the white paper and declined. He was the *only* physician on the ACR HII to not endorse this publication,** which was also endorsed by the leadership of the American College of Radiology (ACR), American Society of Neuroradiology (ASNR), American Society of Functional Neuroradiology (ASFNR), and American Society of Pediatric Neuroradiology (ASPNR). Of key importance, Dr. Lipton is a proud member of all of these societies with the possible exception of the ASPNR.

9. **Experts in TBI that reviewed, edited and approved this white paper authored many of the papers Dr. Lipton cites in support of the use of DTI in individuals patients.** This group of physicians includes neuroradiologists, neurologists, psychiatrists, and psychologists. The list includes numerous leaders in the field of TBI research, chairpersons of departments and chiefs of divisions across this country at the premiere medical universities and hospitals. They are listed below:

Significant contributors: T. Jason Druzgal, MD, PhD, Department of Radiology, University of Virginia, Charlottesville, Virginia; Alisa D. Gean, MD, Department of Radiology, University of California, and Brain and Spinal Injury Center, San

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Francisco General Hospital, San Francisco, California; Yvonne W. Lui, MD, Department of Radiology, New York University School of Medicine, New York, New York; Alexander M. Norbash, MD, Department of Radiology, Boston University School of Medicine, Boston, Massachusetts; Cyrus Raji, MD, Department of Radiology, University of California, Los Angeles, Los Angeles, California; David W. Wright, MD, FACEP, Department of Emergency Medicine, Emory University School of Medicine, Atlanta, Georgia; Michael Zeineh, MD, Department of Radiology, Stanford University, Palo Alto, California. This article was reviewed and approved by: Joseph M. Aulino, MD, Department of Radiology, Vanderbilt University, Nashville, Tennessee; Jeffrey T. Barth, PhD, Department of Psychiatry and Neurobehavioral Sciences, University of Virginia, Charlottesville, Virginia; Michael Brant-Zawadzki, MD, FACR, Hoag Hospital, Newport Beach, California; Asim F. Choudhri, MD, Department of Radiology, University of Tennessee Health Science Center, Memphis, Tennessee; Amanda Corey, MD, Department of Radiology, Emory University School of Medicine, Atlanta, Georgia; Rebecca S. Cornelius, MD, FACR, Departments of Radiology and Otolaryngology, University of Cincinnati Medical Center, Cincinnati, Ohio; Cameron Craddock, PhD, Center for the Developing Brain, Child Mind Institute, New York, New York; Burton P. Drayer, MD, Department of Radiology, Mount Sinai Hospital, New York, New York; Steven Flanagan, MD, Department of Rehabilitation Medicine, New York University Langone Medical Center, New York, New York; Magali Haas, MD, PhD, Orion Bionetworks; Joseph A. Helpern, PhD, Department of Radiology, Medical University of South Carolina, Charleston, South Carolina; Ramona Hicks, PhD, Program Director, Repair and Plasticity, National Institutes of Health/National Institute of Neurological Disorders and Stroke, Bethesda, Maryland; Randy Horton, American College of Radiology Head Injury Institute, Reston, Virginia; Patricia Hudgins, MD, Department of Radiology, Emory University School of Medicine, Atlanta, Georgia; Carolyn Cidis Meltzer, MD, FACR, Department of Radiology and Imaging Sciences, Emory University School of Medicine, Atlanta, Georgia; David Mikulis, MD, PhD, Department of Radiology, University of Toronto,

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Toronto, Ontario, Canada; Sumit N. Niogi, MD, PhD, Department of Radiology, New York-Presbyterian Hospital, Weill Cornell Medical Center, New York, New York; Michael Rothman, MD, Bethlehem, Pennsylvania; David Seidenwurm, MD, Department of Radiology, Sutter Health, Sacramento, California; Martha Shenton, PhD, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts; James R. Stone, MD, PhD, Department of Radiology, University of Virginia, Charlottesville, Virginia; Gordon Sze, MD, Department of Radiology, Yale University, New Haven, Connecticut; Elizabeth A. Wilde, PhD, Departments of Physical Medicine and Rehabilitation, Neurology, and Radiology, Baylor College of Medicine, Houston, Texas; David W. Wright, MD, FACEP, Department of Emergency Medicine, Emory University School of Medicine, Atlanta, Georgia; Robert D. Zimmerman, MD, Department of Radiology, Weill Cornell Medical College, New York-Presbyterian Hospital, New York, New York.

10. Of note, Dr. Lipton includes an out of context comment in his affirmation from a paper written by Dr. Jonathan Silver, a prominent psychiatrist at New York University, concerning the use of DTI in soldiers (p16). However, Dr. Silver reviewed the ACR white paper and states in his *New England Journal of Medicine Journal Watch*: “Is there a role for cutting-edge imaging techniques in TBI diagnosis? The many research advances in neuroimaging after TBI have been of particular interest in mild TBI, especially concussions, which currently lack objective “markers” of injury. Outside clinical care, in litigation to “prove” TBI, these modalities are frequently used but with much controversy. **This white paper from the American College of Radiology Head Injury Institute was reviewed and approved by prominent researchers in TBI. Their conclusion: These techniques (including diffusion tensor imaging, functional magnetic resonance imaging, and magnetic resonance spectroscopy) are for research only.** The paper concludes that at this time “there is insufficient evidence supporting the routine clinical use of advanced neuroimaging for diagnosis and/or prognostication at the individual patient level.” The bottom line: This valuable research

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tool requires much more work before it is clinically (or legally) applicable to a specific patient.”

(<http://www.jwatch.org/na36084/2015/05/12/reviews-note?variant=full-text>).

11. DTI HAS NEVER BEEN UTILIZED FOR ANY CLINICAL PURPOSE RELATED TO TRAUMATIC BRAIN INJURY AT THE NEWYORK-PRESBYTERIAN HOSPITAL - WEILL CORNELL MEDICAL COLLEGE. Mr. Flomenhaft repeatedly makes this erroneous claim. He has no knowledge of what clinical services and research are performed at NYPH-WCMC and only produces a marketing flyer from 2010. The flyer he produces clearly states:

With this in mind, a study group led by Dr. Roger Härtl, team neurosurgeon of the New York Giants and staff neurosurgeon at Weill Cornell Medical College and NewYork-Presbyterian Hospital/ Weill Cornell Medical Center, has been created to evaluate a new method of MRI called diffusion tensor imaging (DTI) in the diagnosis of concussions. The DTI specifically evaluates integrity of the brain's axons: the wires that connect the circuitry of the brain. These axons, or wires, are known to be preferentially damaged in trauma, but this injury cannot be adequately imaged or evaluated on standard MRI. It is the hopes of the research team by evaluating axonal injury, to create a more sensitive and specific test to evaluate the injury a football player suffers during competition, and that DTI will ultimately better guide physicians on how to counsel and treat players who have been injured.

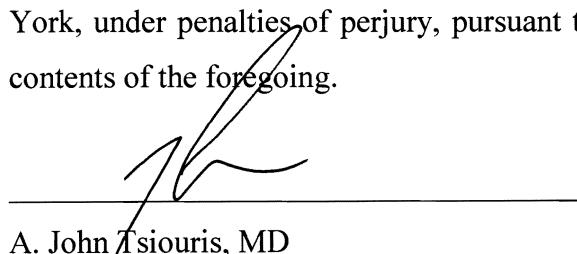
The wording is unambiguous: “evaluate a new method”, “research team”, “create a more sensitive and specific test” are all terms that indicate that DTI is only being used as a research tool. Currently, there are numerous ongoing research protocols in place at NYPH-WCMC that recruit patient with traumatic brain injuries and include MRI with advanced imaging techniques such as DTI, resting state functional MRI, arterial spin labeled perfusion and spectroscopy in adults and children. As one of the neuroradiologists on our MRI/DTI research team at NYPH-WCMC, I can *definitively* state that we do not perform this study in individuals to diagnose or characterize TBI. No reports for individuals are generated and all data is de-identified and archived for investigational purposes.

Finally, while I am aware that Mr. Flomenhaft and Dr. Lipton claim that DTI has been used clinically at some institutions, approved by the FDA and recoverable as

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medical payments under insurance, I must advise that these are *significantly* flawed arguments for numerous reasons. First, as discussed above, these arguments were made with regards to the prior DTI method Dr. Lipton was utilizing (for the subject 2008 DTI) which is obsolete. Second, any argument that FDA approval of DTI has any relation to DTI being generally accepted by the neuroradiological community for diagnoses and assessment of TBI in single subject patients is a 100% falsity. FDA approval merely means that DTI is safe to use on humans, i.e. that it won't cause harm. We could not perform DTI research if there was no FDA approval. All physicians are well aware that FDA approval does not mean that the approved drug, device or in this case MRI sequence (DTI) is generally accepted for diagnosing or assessing *any* disease or disorder. The FDA recently had a public workshop in Washington DC titled "Advancing the Development of Biomarkers in Traumatic Brain Injury" on March 3, 2016. This workshop was an educational workshop with presentations by numerous experts in traumatic brain injury on the ongoing research for the development of TBI biomarkers. DTI was a recurrent theme and consistently discussed as a potentially promising but currently limited technique that was *not ready to be used in individuals*. The complete transcript of this FDA workshop is publicly available at: <http://www.fda.gov/MedicalDevices/NewsEvents/WorkshopsConferences/ucm483551.htm#transcript>. Third, the argument that DTI is a recoverable medical bill through insurance is incorrect and misleading. All DTI studies are performed in association with a standard anatomic MRI, which is what is actually billed. There is no stand-alone billable DTI Current Procedural Terminology (CPT) code. All of these arguments have been a crutch for Plaintiffs seeking to improperly utilize DTI in a traumatic brain injury lawsuit, but as discussed above are inaccurate.

I, A. John Tsioris, M.D., being a physician duly licensed to practice in the State of New York, under penalties of perjury, pursuant to CPLR Section 2106, do hereby affirm the contents of the foregoing.



A. John Tsioris, MD



8/22/2016

Date

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Weill Cornell Medical College *Curriculum vitae and Bibliography***A. GENERAL INFORMATION**

1. Name: Apostolos John Tsiouris, M.D.
2. Office address, telephone, fax: 525 East 68th St, Starr 630C, NY, NY 10065
212-746-2562
3. Work email apt9001@med.cornell.edu
4. Personal email john.tsiousris@me.com

B. EDUCATIONAL BACKGROUND

1. Degree(s)

Degree	Institution	Dates attended	Year
B.A.	The Johns Hopkins Univ	8/1989-6/1993	1993
	Baltimore, MD		
M.D.	Cornell Medical College	8/1993-6/1997	1997
	New York, NY		

C. PROFESSIONAL POSITIONS AND EMPLOYMENT

1. Post-doctoral training

Title	Institution name and location, dates held
Intern	Lenox Hill Hospital, New York, NY; Internship in Medicine, July 1997 – June 1998
Resident	NewYork-Presbyterian Hospital-Weill Cornell Medical Center, New York, NY; Residency in Diagnostic Radiology, July 1998 – June 2002

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Fellow New York-Presbyterian Hospital-Weill Cornell Medical Center and
 Memorial Sloan Kettering, New York, NY; Fellowship in
 Neuroradiology (Chief), July 2002 – June 2003

2. Academic positions

Title	Institution	Dates held
Assistant Professor	New York-Presbyterian Hospital – Radiology Weill Cornell Medical Center	7/2003-2009
	New York, NY	
Associate Professor	New York-Presbyterian Hospital –	7/2009–present
Clinical Radiology	Weill Cornell Medical Center	
	New York, NY	

3. Hospital positions

Title	Institution	Dates held
Attending Physician	New York-Presbyterian Hospital – Weill Cornell Medical Center	7/2003-present
	New York, NY	

4. Other Employment

Title	Institution	Dates held
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D. LICENSURE, BOARD CERTIFICATION, MALPRACTICE

1. Licensure

State	Number	Date of issue	Date of last Registration
NYS		12/2002	10/2014 (Exp 12/2016)

a. If no license:

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- (1) Do you have a temporary certificate?
- (2) Have you passed the examination for foreign medical school graduates?

b. DEA number:

2. Board Certification

Full Name of Board	Certificate #	Date (MM/DD/YY)
American Board of Radiology	49375	11/11/2002
(Participating in MOC)		
CAQ in Neuroradiology	11/6/2005	
(Participating in MOC)		
Participating in Maintenance of Certification (MOC)	Certification current	

3. Malpractice insurance

Do you have Malpractice Insurance? YES

Name of Provider:	MCIC Vermont Inc.
Premiums paid by:	NYPH – Weill Cornell Medical Center

E. PROFESSIONAL MEMBERSHIPS

Member/officer	Name of Organization	Dates held
Member	ENRS	2014-present
Member	ASNR	2007-present
Member	ARRS	2007-2009
Member	AUR	2006-present
Member	RSNA	2002-present
Member	ACR	2002-2005, 2013-present

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Member present	NYRRS	1998-2004, 2012-
Member (inactive)	Alpha Omega Alpha	1995-present
Member	AMA	1994, 1997, 2012-present

F. HONORS AND AWARDS

1. Name of award	Date awarded
J. Lawton Smith, MD Award (Best Original Contribution, <i>J of Neuro-Ophthalmology</i>) 2015	
WCMC Neurological Surgery Teacher of the Year Award	2008
Robin C. Watson Radiology Teacher of the Year Award for NYPH-WCMC, MSKCC, and Hospital for Special Surgery	2007
Alpha Omega Alpha – Cornell Medical	1995
Hellenic Medical Society Scholarship	1994
NIH Summer Research Fellowship	1994
Phi Beta Kappa – Johns Hopkins	1993
Psi Chi National Psychology Honors Society	1992

G. INSTITUTIONAL/HOSPITAL AFFILIATION

1. Primary Hospital Affiliation
 - a. NYPH – WCMC
2. Other Hospital Affiliations
 - a. Hospital for Special Surgery

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3. Other Institutional Affiliations

H. EMPLOYMENT STATUS

1. Name of Current Employer(s):

NewYork-Presbyterian Hospital-Weill Cornell Medical Center

2. Employment Status: ***Full-time salaried by NYPH-WCMC*****I. CURRENT AND PAST INSTITUTIONAL RESPONSIBILITIES AND PERCENT EFFORT**

1. Teaching

(1) Medical Students(a) *Brain and Mind/Behavior*, 2003-present

- (i) Neuroradiology section course director
- (ii) Present three radiology-anatomy correlative lectures annually to small groups on the skull base, the orbits and the neck
- (iii) Give two 1½ hour lectures annually on the introduction to neurological imaging
- (iv) Present B&M lectures via TC to the WCMC-Qatar

(b) *Human Structure and Function*, 2008-present

- (i) Give one lecture annually on anatomy and imaging of the spine
- (c) Jointly developed online/iPad anatomy teaching application (RadStax) with Dr. Petro Kostandy and Philip Colluci (2012-2013)
 - (i) Utilized for teaching medical students in *Brain and Mind* and *Human Structure and Function* courses
- (d) Medical student advisor, 2004-present

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- (e) Course director/sponsor for the Neuroradiology RAD.110B.NY medical student elective, 2003-present.
- (f) Give 1-hour monthly lecture to rotating medical students on neuroanatomy and neuroimaging techniques for the Introduction to Clinical Imaging elective RAD.104.NY, 2004-present.

(2) Residents

- (a) Radiology residents
 - (i) Didactic neuroradiology lectures, given annually 2005-present
 1. Introduction to MR imaging of the Spine, 2 annual 1-hour lectures
 2. Clinical MR Spectroscopy
 3. Orbital Pathology
 4. Imaging of Aneurysms
 5. MR Artifacts
 - (ii) Board Review, given annually 2003-present
 1. 6 hours of board review in the form of simulated oral board examination including cases in cerebrovascular disease, congenital anomalies of the brain and spine, brain neoplasms, head and neck neoplasms, inflammatory and infectious diseases of the brain, spine, head and neck, spinal neoplasms, head and spine trauma, etc
 - (iii) Ratings have been consistently above 4.9/5 by residents

(3) Neurosurgery residents

- (a) Weekly neurosurgery teaching conference, 2006-present
 - (i) Review interesting and challenging neurosurgical cases with neurosurgery residents and attendings; discussions include patient

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presentation, interpretation of imaging examinations, discussion of differential diagnoses, treatment decisions and surgical outcomes.

- (ii) Annual NS board review in neuroimaging interpretation, 4 hrs
- (iii) Ratings: Consistently cited by neurosurgery residents as one of the most valuable teaching conferences.

(4) Neuroradiology fellows

- (a) Neuroradiology fellow annual lectures, 2003-present

- (i) Clinical MR Spectroscopy
 - (ii) Imaging of Spinal Neoplasms
 - (iii) Imaging of Spinal Vascular Malformations

- (b) Neuroradiology CAQ review

- (i) 4 hours annually of simulated oral board CAQ examination

(5) Neurosurgery PA/RN course instructor, 2006-present

- (a) Present three annual 1 hr lectures followed by a Q&A session to the neurosurgery staff reviewing neuroimaging tailored to the PA/RN level. These lectures are part of a neurosurgery course run by Dr. John Boockvar designed to further educate the neurosurgery physician extenders, assistants and nurses. My lectures focus on radiation and MR safety, issues with contrast in imaging, ordering the appropriate examination, and basic imaging interpretation.

(6) Invited CME Lectures

- (a) Eastern Neuroradiology Society August 12, 2016, Quebec City, Quebec. *30 Min Intracranial Vessel Wall Imaging*
- (b) Radiology Grand Rounds, Thomas Jefferson University, Philadelphia, PA. March 16, 2016. *Diffusion Tensor Imaging for Traumatic Brain Injury.*

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- (c) Hands-On Clinical fMRI and Diffusion Tractography. December 9-11, 2015. *Diffusion Tensor Imaging in Mild Traumatic Brain Injury*. CME lecture given 3X/year since April 2012.
- (d) Advanced Endoscopic Skull Base and Pituitary Surgery. NYPH-WCMC, NY, NY. May 8, 2015. *Imaging of the Sellar/Parasellar and Sinonasal Pathology*.
- (e) Multidisciplinary Spine Oncology Symposium. MSKCC, NY, NY. April 17-18, 2015. *Imaging Spine Neoplasms*.
- (f) Hospital for Special Surgery – Department of Neurology Grand Rounds: *Imaging of Spinal Vascular Diseases*. February 27, 2015
- (g) Eastern Neuroradiology Society August 3, 2014, Manchester, Vermont. *Self-Assessment Module: Imaging of Spinal Vascular Diseases*.
- (h) Ophthalmology Grand Rounds, NYPH-WCMC, New York, NY. May 1, 2014. *Imaging of Orbital Masses*.
- (i) Neurosurgery Grand Rounds, NYPH-WCMC, New York, NY. October 22, 2012. *Advanced Neuroimaging Techniques*.
- (j) Weill Cornell Spine Center: Multidisciplinary Evaluation and Management of Spine Pain. May 5, 2012, NY, NY. *Imaging Low Back Pain*.
- (k) Eastern Neuroradiology Society. September 15, 2011, Chatham, MA. *Advanced MR Imaging of Brain Tumors*.
- (l) Brain Attack and Cerebrovascular Disease Update 2011, New York, NY. March 9, 2011. *Imaging Cryptogenic Stroke*.
- (m) Brain Attack and Cerebrovascular Disease Update 2010, New York, NY. March 5, 2010. *Advanced Neuroimaging Techniques for Stroke*.
- (n) Eastern Neuroradiology Society August 22, 2009, Hershey, PA. *Self-Assessment Module: Imaging of Spinal Vascular Diseases*.

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- (o) Brain Attack and Cerebrovascular Disease Update 2009, New York, NY. March 27, 2009. *Advanced CT and MR Imaging in Stroke.*
- (p) Neurosurgery Grand Rounds, NYPH-WCMC, New York, NY. February 23, 2009. *What You Need To Know About Identity Theft.*
- (q) American Society for Neuroradiology Annual Meeting 2008, New Orleans, LA. June 1, 2008. *Cerebrovascular Disease Case Based Review.*
- (r) Neurology Grand Rounds, NYPH-WCMC, New York, NY. March 5, 2008. *Advanced Imaging of Stroke.*
- (s) Brain Attack and Cerebrovascular Disease Update 2007, New York, NY. November 9, 2007. *Advanced CT and MR Imaging in Stroke.*
- (t) Neurology Grand Rounds, NYPH-WCMC, New York, NY, November 9, 2006. MR Imaging of Creutzfeld Jacob Disease.
- (u) CPC on CNS Vasculitis, HSS, New York, NY. May 31, 2006. *Neuroimaging of CNS Vasculitis.*
- (v) New York Roentgen Ray Society Annual Meeting 2005, New York, NY. April 1, 2005. *3 Tesla MRI of the Brain.*

(7) Mentorships, Advising and Supervision

- (a) Mentor and supervise medical students, residents, and fellows in Neuroradiology research and academic publication:
 - (i) Sumit Niogi, 2012-213. Currently mentoring in multiple research projects that include the use of DTI in TBI and quantitative susceptibility imaging in ALS. Presented work at ASNR 2013.
 - (ii) Andrew Schweitzer, 2012-2013. Currently mentoring in a research project investigating the use of quantitative susceptibility imaging as a biomarker for ALS. Presenting work at ASNR 2013.
 - (iii) Sahil Sood and Ajay Gupta, 2009. Currently mentoring these radiology residents and co-authoring a chapter in Seminars in

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Roentgenology on Advanced Brain MR Imaging Techniques
(diffusion weighted imaging, perfusion imaging, DTI,
tractography).

- (iv) Stuart Bentley-Hibbert 2007-2008. Mentored this radiology resident in writing an IRB that was accepted in 2007 on utilizing MRA angiography to diagnose recurrent aneurysms status post endovascular GDC embolization. Research project is currently active.
 - (v) Monica Deshmukh, 2005. Mentored this visiting medical student from UMDNJ in writing a case report on a rare orbital pathological process.
- (b) Mentor and advise radiology residents and neuroradiology fellows on career opportunities in academic medicine and private practice:
- (i) Andrew Schweitzer, 2012-2015. Neuroradiology fellow. Collaborated on multi-institutional study assessing the utility of QSM for the diagnosis of ALS.
 - (ii) Gregory Bionci, 2011-2012. Former Cornell medical student, currently radiology resident at Brigham and Women's Hospital, Boston, MA
 - (iii) Stephen Seedial, 2011-2012. Former Cornell medical student, currently radiology resident at Northwestern, Chicago, Illinois
 - (iv) Petro Kostandy, 2011-2012. Former Qatar Cornell medical student, currently radiology resident at Syracuse. Co-developed novel internet browser and iPad interactive anatomy teaching tool (RadStax) for medical student teaching.
 - (v) Andrew Schweitzer, 2011-2012. Current Cornell radiology resident
 - (vi) Sahil Sood, 2009-2012. Former Cornell radiology resident and fellow, currently in private practice in San Francisco, CA

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- (vii) Walter Zink, 2007-2009. Former Cornell radiology resident and neuroradiology fellow, currently in private practice in Texas.
- (viii) Zuzan Cacyi, 2005-2008. Former Cornell neuroradiology fellow, currently assistant professor at U of Minnesota.
- (ix) Thomas Keane, 2005-2008. Former Cornell radiology resident, currently in private practice in Cleveland, OH
- (x) Sanjay Chakrapani, 2005-2008. Former Cornell radiology resident, currently in private practice in Portland, Oregon.
- (xi) Michael Kim, 2005-2006. Former Cornell medical student, currently in academic radiology at UCSF.
- (xii) Stella Kang, 2006-2007. Former Cornell medical student, currently in academic radiology.
- (xiii) Rebecca Johnson, 2004-2006. Former Cornell radiology resident, currently in academic practice at The Cleveland Clinic.

2. Clinical care (duties, dates)

- (1) Neuroimaging interpretation (CT and MRI of brain, spine and head/neck), 2003-present
- (2) Neurointerventional procedures (i.e. lumbar punctures, myelograms, biopsies), 2003-present
- (3) Provide consultation to referring physicians and patients
- (4) Responsible for Neurological MRI imaging quality and protocol management

3. Administrative duties, including committees, dates

- (1) Director of MRI, NewYork-Presbyterian – Weill Cornell Medical Center, 2014-present

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- (2) Physician director at NYPH-WCMC 55th Street outpatient practice, 2012-present
- (3) Education Committee Member, 2003-present
- (4) Radiology Admissions Committee Member, 2003-present
- (5) Neuroradiology Fellow Selection Committee, 2003-present
- (6) QPS Committee Member, 2004-present
- (7) QPI Committee Member, 2008-present
 - (a) Organize and lead bimonthly CME QPS Radiology Morbidity and Mortality conference
- (8) MRI Modality Committee Member, 2003-2013; Leader, 2014-present
- (9) Cornell Radiology Web Design and Maintenance, 2005-present

4. Research

- a. Collaborating with Dr. Pina Sanelli investigating CT Perfusion as a clinically useful tool.
- b. Investigating the use of susceptibility weighted imaging (SWI) with quantitative susceptibility (QSM) mapping in amyotrophic lateral sclerosis (2012-present).
- c. Investigating the use of diffusion tensor imaging (DTI) in sports-related concussions (2011-present).

<u>Current Percent Effort (%)</u>	<u>Does the activity involve WMC students/researchers? (Yes/No)</u>
Teaching	25%
Clinical Care	60%
Administration	5%

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Research	10%	YES
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TOTAL: 100%

J. RESEARCH SUPPORT

Ongoing Research Support

Nation Institute of Health (NIH)

Wang (PI) 12/2010-12/2015

MRI method for quantitatively mapping cerebral microbleeds

Role: Co-Investigator

Nation Institute of Health (NIH)

Wang (PI) 04/2012-04/2014

Analyses of gradient echo MRI Data

Role: Co-Investigator

Completed Research Support

National Institute of Neurological Disorders & Stroke (NINDS)

Huang, Chaorui (PI) 06/2009-06/2014

Neuroimaging and Metabolomics Correlates of Cognitive Decline in Parkinson's Disease

Role: Co-Investigator

National Institute of Neurological Disorders and Stroke (NINDS)

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Sanelli (PI) 08/2008-07/2013

Improving clinical outcomes in aneurysmal subarachnoid hemorrhage using CT perfusion

Role: Co-Investigator

American Heart Association

Sanelli PC (PI) 12/01/07-07/31/08

Improving clinical outcomes in aneurysmal subarachnoid hemorrhage using CT perfusion

Role: Co-Investigator

Neuroradiology Education and Research Foundation

Sanelli PC (PI) 12/01/07-11/30/09

Assessing the value of CT perfusion in improving clinical outcomes in aneurysmal subarachnoid hemorrhage using a decision analytic model

Role: Co-Investigator

K. EXTRAMURAL PROFESSIONAL RESPONSIBILITIES

- a. ACR Head Injury Institute HI-RADS Committee Chair (2016)
- b. Committee member of ACR Head Injury Institute (2012-present)
- c. ASNR education committee member, 2007-2015
- d. Radiographics Educational Exhibits Reviewer, RSNA 2007-present
- e. ASNR Abstract Reviewer, 2008-present
- f. Peer reviewer: *American Journal of Neuroradiology (AJNR)*

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- g. Peer reviewer: *PLOSONE*
- h. Peer reviewer: *Clinical Imaging, Elsevier*
- i. Peer reviewer: *The Journal of Radiology Case Reports*
- j. Multi-disciplinary conferences
 - (1) Lead weekly INR/neurovascular conference
 - (2) Lead weekly Neurosurgery case conference
 - (3) Lead weekly Ophthalmology conference
 - (4) Participate in weekly neurology neurovascular, neuro-oncology tumor board, and pediatric neurology conferences

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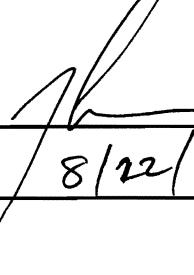
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